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ABSTRACT

Drawn from a larger paper on geographical isolation, these pages present a review of literature pertaining to geographical isolation factors. The inclusion of a geographical isolation factor in a state's distribution formula for foundation aid is a mechanism for providing additional revenue to small schools or school districts that, because of geographical location, cannot be consolidated into more efficient units. First, the paper develops a rationale for such factors by briefly examining the literature dealing with the problems facing small schools. The major problem examined is that of high cost of operation stemming from low student-teacher ratios, increased transportation costs, and fixed costs that do not decrease with school size. Other problems include inability to offer a broad curriculum, inability to attract a well-qualified staff, and inefficiency. Possible methods suggested for dealing with such problems include interdistrict cooperation, formation or expansion of intermediate regional education agencies, increased state aid, and school district consolidation. Next, a review of the criteria to be included in the formulation of geographical isolation factors is presented, including maximum size that such a school may have and a definition of isolation. Finally, methods for apportioning supplemental revenues to geographically isolated schools are reviewed. (Author/JM)

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GEOGRAPHICAL ISOLATION FACTORS: THE LITERATURE

A Review of the Literature from

ENACTMENT AND IMPACT OF
GEOGRAPHICAL ISOLATION FACTORS
IN PUBLIC SCHOOL REVENUE LEGISLATION
IN THREE SELECTED STATES

Doctoral Dissertation by
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Geographical Isolation Factors: The Literature

This section of the study presents results of a review of literature pertaining to geographical isolation factors. First, a rationale for such factors is developed by briefly examining the problems facing small schools and possible methods of dealing with those problems. Next, a review of the criteria to be included in the formulation of geographical isolation factors is presented. Finally, revenue considerations for the implementation of geographical isolation factors are studied.

Rationale

Small schools face many problems. Among the most significant are the problems associated with high per pupil costs, inefficient use of resources, limited curriculum, staffing, and operation of non-high school districts. These problems and possible solutions are examined here in an effort to provide a rationale for the employment of geographical isolation factors.

Small school problems. Discussions of the problems facing small schools in America generally include high costs per pupil as a major problem or as a major consequence of other problems. Johns and Alexander (1971), Pierce et al. (1975), Johns (1975), Burrup (1977), the Pennsylvania Department of Education (1977), and Swift (1978) all cited the special needs and resultant high costs of small schools. McLure (1947) gave a representative view regarding the high costs of small schools.

> . . . in small communities where there are not enough children to form large schools the people must spend more money per pupil in order to provide education comparable to that provided in larger communities where larger schools can be operated (pp. 2-3).

The Washington (State) Temporary Special Levy Study Commission (1971) cited the reasons for these high per pupil costs as low student-teacher ratios, transportation needs, and fixed operating and maintenance expenses. The Commission noted that small schools typically had low teacher salaries but that these savings were more than offset by the low student-teacher ratios common in small schools. Honey (1978) noted that a state-mandated curriculum aggravated the cost problem in small schools. Sher (1978) attributed high per pupil costs to transportation, energy, administrative overhead, and "other fixed costs." McLure (1947) separated the higher costs into two categories--small school, or size, costs and transportation costs. Johns and Morphet (1975) said that "relatively small high schools are even more expensive and probably less satisfactory than small elementary schools" (p. 188). An example of these higher costs was given by the Washington Temporary Special Levy Study Commission (1971).

> The average per-pupil expenditure in the state [Washington] (1968-69) was $662. Eighty percent of the school districts larger than 1,000 students spent between $560 and $1,080 per pupil, and 50 percent spent between $600 and $800 per pupil. All 25 high school districts smaller than 200 students spent more than $770 per student, and 10 spent [in excess of] $1,000 per student (p. 23).

Sadler and Ching (1975) used a linear programming model to derive per student costs and confirmed, in hypothetical models based upon actual input data, the increasing costs as a consequence of decreasing size of high schools.

Closely related to costs is the concept of efficiency of operation. Levin (1970) described efficiency as the use of physical resources or dollar budget in such a way as to achieve greater educational output. He also equated efficiency with the term "economies of scale." Cohn

(1968) explained economies of scale as the ability of a larger school "to spend a smaller amount of resources per student for the same quality of education" (p. 434). Hanson (1964); Swanson (1966); Johns and Alexander (1971); Rossmiller (1973); Chambers, Odden, and Vincent (1976); and Webb (1979) all noted that small schools tend to utilize available resources in an inefficient manner. Efficiency is possible in larger districts because of larger classes which provide the ability to allocate the costs of specialized equipment, administration, and other budget items over a larger enrollment (White and Tweeten 1973). Reischauer and Hartman (1973) illustrated the inefficiency of small rural schools when they said that "a physics or calculus class that requires a specially trained teacher becomes terribly expensive because the cost of providing the class can be spread over only a handful of students" (p. 60). Blikre (1960), considering superintendents' responses to a questionnaire, said that "almost one-half the respondents looked upon more efficient use of money for educational purposes as a reason for more enlarged school districts" (p. 305).

The problems of cost and inefficiency were summarized by Johns (1975).

> Numerous researches in school finance have shown that the cost per student in sparsely settled areas and in small districts is greater for equivalent programs and services than in larger and more densely settled districts. Large school districts have economies of scale not possible in small population districts. Sparsely settled districts with a widely dispersed pupil population must operate small schools, especially small high schools, which have a high per student cost if appropriate educational programs are provided (p. 2).

Sher, education advisor to the National Rural Center, conceded that small schools did have higher costs per pupil but strongly rebutted the implication that small schools were inefficient.

> The most important and unique feature of rural school finance lies in the higher costs associated with sparsity of population. A relatively sparse population base is, of course, a defining characteristic of any rural area. Thus, higher costs which arise as a consequence of this sparsity must be regarded as one of the economic facts of rural life rather than as evidence of wastefulness . . . (Sher 1978, p. 22).

> The frugality and financial conservatism of farmers and other rural residents is legendary throughout the United States. Yet, ironically, the schools run by these same economy-minded rural citizens are routinely assailed outside the rural community as inefficient and uneconomical. . . . a strong case can be made that rural schools and districts use the financial resources available to them in as wise and effective a manner as any of their urban and suburban counterparts (Sher 1978, p. 22).

Curriculum is another problem area for small schools. Rossmiller (1973), Johns and Morphet (1975), Honey (1978), and Swift (1978) noted that many small school districts were able to offer only a limited educational program. Where small schools did offer a broader, more comprehensive program, they did so only at great cost. As reported earlier, Reischauer and Hartman (1973) found curriculum offerings to be limited by the small school's inability to spread the costs of specialized courses over a large enough number of students. Examining a range of course offerings, White and Tweeten (1973) calculated a minimum enrollment in average daily attendance (ADA) of 550 pupils in order to offer their "minimum" program at lowest cost. The "desirable" broader program could not be offered, they calculated, at minimum cost with an enrollment below nine hundred students (ADA). Benson (1975) found that "a district that enrolls 150 high school students cannot offer a full program of sciences, specialized mathematics, foreign language, and cultural subjects except at a cost in the range of $4,000 to $6,000 a student" (p. 107). When McLure (1975) studied school programs, he

found that school size accounted for 55 percent of the variance in the breadth of program. The Washington Temporary Special Levy Study Commission (1971), after a thorough study of schools in that state, reported little difference in the curriculum of elementary schools of various sizes, attributing the substantial uniformity to the limited range of subjects taught at that level. At the high school level, however, the Commission found that the number of subjects offered for grades ten through twelve varied from thirteen courses in a small high school to two hundred courses in a large metropolitan school. Districts smaller than 1,600 students offered an average of thirty-five subjects while larger districts offered an average of fifty-five. The Commission reported that "there was a definite decline in curriculum diversity as school district size decreased" (p. 15). The Temporary Special Levy Study Commission summarized that portion of their report dealing with curriculum.

> . . . though it can be overdone, a certain amount of diversity in course offerings is valuable in stimulating different kinds of students. While the larger schools may have trouble setting priorities, the smaller schools do not even come close to equivalence in either the variety or depth of course work available in the larger schools. This is not, of course, to generalize about the quality of teaching in either size of school (p. 16).

Problems relating to staff also affect small school districts. The National Commission on School District Reorganization (1948) noted that "the inadequacies of thousands of small school districts is [sic] most clearly shown in their ability to attract and keep well-qualified teachers" (p. 19). This problem was also noted by the Washington Temporary Special Levy Study Commission (1971).

> The average experience and education level of teachers tends to decrease with decreasing size of districts. This

> corresponds with an increased turnover rate in the smaller districts.
>
> . . . . . .
>
> Teacher turnover per year is . . . averaging nearly 45 percent in districts with fewer than 200 students, and only 15 percent in districts with enrollments surpassing 1,600. The turnover rate has been nearly constant for all sizes of districts over the past four years (p. 24).

The Commission found that teachers in smaller schools tended to have lower pay scales and a greater teaching burden. Small school teachers averaged 1,089 classroom contact hours per year while teachers in large districts averaged only 889. The Commission went on to note that "not only do small district teachers spend more time in class than do large district teachers, the secondary teachers in small districts teach a greater variety of courses each day" (p. 24). Senior high teachers in small districts taught 5.9 different subjects while those in large districts only taught 3.3 different subjects. National Education Association Research (1977) also noted the problems of staffing in small schools: fewer teachers with masters degrees, more non-degree teachers, less experienced teachers, longer work weeks, and lower salaries. Reischauer and Hartman (1973) suggested that "because small towns and rural areas have traditionally held little attraction for college-trained labor, it is possible that extremely high salaries . . . would have to be paid to lure highly qualified educators to isolated school districts" (p. 61).

A final small school problem to be discussed in this chapter relates to districts that do not operate a high school. The National Commission on School District Reorganization (1948), the Washington Temporary Special Levy Study Commission (1971), and others have called for the elimination of non-operating and elementary-only school districts through the mandatory establishment of unified (K-12) districts.

Hooker and Mueller (1970a) noted that an increasing number of states require that all reorganized districts be unified or that all land in the state be in a school district which maintains a high school. Johns and Morphet (1975) noted that non-unified school districts "create confusion in contending for local tax resources to educate students of different age levels" (p. 339).

Burrup (1977) enumerated what he referred to as "principles concerning small and large schools that have become accepted as a result of che experience of the several states over the years" (p. 92). Five of Burrup's principles provide a summary of the review of the problems facing small schools.

> 1. Maintaining a small school district with only one or two small attendance areas is indefensible in terms of aims and objectives of present-day education. This does not rule out the obvious fact that some small schools and districts will always be needed in some sparsely populated areas of this country.
> 2. Small school districts and small attendance areas are comparatively inefficient and often represent an unnecssary [sic] waste of tax funds.
> 3. Small schools suffer from curriculum limitations, even if the wealth of the district makes it financially possible to employ proportionately more and better-trained school staff members.
> 4. Small schools are often unable to attract the best teachers, regardless of the wealth or the available revenues in those districts.
> 5. Small schools suffer from lack of special services, such as health, psychological and counseling programs. No amount of revenue can provide these services if there are not enough pupils to warrant them.
>
> . . . . . .
> (Burrup 1977, p. 92).

Solutions to small school problems. A number of different problems of small schools have been presented. Suggested actions to solve these problems are even more numerous. There seem to be four major types of activity which could help resolve small school problems:

interdistrict cooperation, formation or expansion of intermediate or regional education agencies, increased state aid, and school district consolidation or reorganization (Hooker and Mueller 1970a, Tompkins 1977). However, this study will focus on the latter two practices--increased state aid and reorganization--because they deal directly with the major problems of high cost and inefficient operation. The use of the geographical isolation factor, a hybrid approach related to both increased aid and reorganization, will also be considered as a solution to small school problems.

Garms, Guthrie, and Pierce (1978) defined "sparsity aid" as the allocation of additional funds per pupil "to compensate for the higher costs in small and sparsely settled rural districts" (p. 409). They found that in 1977 twenty-five states had such aid in their school revenue distribution formulas. Hooker and Mueller (1970b) also noted that some legislatures had increased state levels of school support but stated that the additional aid has been given "under conditions that have subsidized ineffective and inefficient administrative units" (p. 2). Swift (1978) said that "it appears inefficient to provide large amounts of size adjustment money to many of the districts with low enrollment and to districts with small schools located near larger attendance centers" (p. 95). Johns (1975) agreed with that point of view.

> Experience with state formulas that make provision for the extra costs due to sparsity has shown that great care should be exercised to avoid providing financial incentives for school districts to maintain unnecessary small schools. The operation of unnecessary small schools wastes school funds and prevents pupils from having access to the educational programs they need (p. 22).

Swift (1978) also said that "it is doubtful that sufficient money could be provided to the very small districts to provide a secondary school breadth of program approaching the statewide median" (p. 95). He went on to recommend that "those districts with very small enrollments and/or very small secondary schools should be encouraged to consolidate schools and districts whenever possible" (p. 95). Additional state aid, then, is not seen as a solution to be applied to all small schools, at least in the opinion of several writers in school finance.

A number of people (e.g., Dawson 1960, Benson 1975, and Johns and Morphet 1975) have urged further consolidation of public school districts in the United States. Arguments made by these authorities in the field of education point out that such redistricting would provide more uniform tax bases, more efficient operation, and lower costs per pupil. Webb (1979) presented a typical case for school district reorganization.

> The concern for school district reorganization is more than just a concern about the total number of school districts in the nation or in a particular state. Behind the numbers lies a concern about the rising costs of education and the ineffectiveness and inefficiency of the large number of small school districts. . . . Thus, the objective of school district reorganization is not simply to reduce the number of school districts or to increase the size of school districts but to realign the enrollment of students to attendance areas that will be able to efficiently use educational dollars and programmatically meet the educational needs of students (p. 342).

Sher (1978) presented a different point of view regarding reorganization and consolidation.

> . . . consolidation is essentially a political issue, rather than an educational or economical one, for it always involves a choice among values, not simply a choice among "objective" facts.
>
> On the basis of current knowledge and understanding, five conclusions seem evident:
>
> 1. That "good" schools and "bad" schools (however defined) come in all sizes. Educational improvement and economic efficiency are the real challenges, and schools of every size could

benefit from efforts in this direction. However there is simply no basis for the belief that making a school (or district) bigger is likely to make it better.

2. After more than 30 years of experience with school and district consolidation, it is clear that consolidation has not lived up to the claims made by its supporters. By and large, the benefits have been exaggerated and the liabilities simply ignored.

3. While some schools and districts can benefit economically or educationally by consolidating, such places are a distinct minority and are becoming increasingly rare. In most cases, it is far more sensible to devise creative ways of bringing resources to children rather than forcing children to go long distances for those resources. However, in all cases, local circumstances would be the key determinant of consolidation's merits.

4. Any decision about consolidation involves tradeoffs. To some individuals, getting what big schools and districts can offer (e.g., more equipment and more specialists) is worth the costs (e.g., loss of a community institution, more transportation, and reduced participation in school and extracurricular activities). To other individuals, the benefits are not worth what must be given up to get them.

5. The decision to consolidate should not be made hastily or without careful consideration of its likely effects. . . . Once old schools have been closed, . . . it is very difficult to go back to the way things were . . . (pp. 17-18).

Studies done by Holland, Baritelle, and White (1976); Sadler and Ching (1975); and Honey (1978) indicated that, although larger districts would provide some savings, transportation costs, social costs to small communities, and other factors may outweigh the benefits of reorganization or consolidation. Thus, the acceptance of consolidation and/or reorganization as a solution to the problems of small schools is not unanimous.

Supporters of larger school district organization, including Johns and Alexander (1971), Johns and Morphet (1975), and Burrup (1977), conceded that further consolidation or reorganization is not a practical solution to small school problems in all parts of the country. Even Conant (1959), a critic of the small high school, conceded this point.

> Undoubtedly there are certain parts of the United States where geographic considerations make small high schools necessary. Population is so sparsely distributed that enough pupils

> just cannot be effectively transported to a central point. . . . A balance must be struck between the benefits derived from education in a high school of sufficient size and the deleterious effects of a long bus ride to and from school each day (pp. 83-84).

The Minnesota Department of Education (1977) studied various solutions to the problems of small schools. They found that additional state aid to all small schools would be ineffective unless unreasonable amounts of state aid were supplied and would provide a disincentive to further reorganization. However, consolidation was impossible in some sparsely populated areas of the state, and sharing of services between districts had limited potential for the immediate future. The Department therefore recommended a geographical isolation factor which would have several characteristics.

> 1) It should be limited to districts which, because of their small size, are unable to provide a high quality educational program under the existing financial system.
> 2) It should further be limited to districts which are so isolated that consolidation would not be practical.
> 3) It should provide the districts classified as small and isolated with enough funds to finance educational opportunities of the same quality as the opportunities available in larger districts (p. 13).

A Northwest Regional Educational Laboratory study recommended a similar program.

> 1. State Boards of Education and State Departments of Education should define criteria for deciding if a small rural high school is "remote and necessary." The criteria should include such considerations as geographic location, topography, climactic conditions and proximity to other high schools in the geographic area.
> 2. Surveys should be made by State Departments of Public Instruction to determine which small rural high schools meet the criteria for being considered "remote and necessary." Those schools which satisfy the criteria should be designated "remote and necessary" for purposes of State Department of Public Instruction evaluation and financial support.
> 3. Small rural high schools which do not meet the criteria to be designated "remote and necessary" should be encouraged

through all possible means to consolidate as quickly as is feasible.

4. State Departments of Public Instruction should provide consultants and financial support for planning by two or more high school districts aimed at consolidation (Ford, Hite, and Koch 1967, p. 36).

Others (Sher 1978, for example) do not favor compulsory redistricting. They support the idea that additional aid will be provided by the state to geographically isolated districts and that other small districts may continue to operate schools if the residents of such districts are willing to provide additional local support. Morphet, Kingsley, and Howsam (1951) recognized this fact.

> The law should provide that if . . . inadequate districts choose to continue as separate districts . . . the taxpayers of those districts would bear the extra expense involved in providing adequate school services and facilities for the children of the district.
>
> Under no conditions should the taxpayers of the entire state be expected to care for the extra expense of operating inefficiently organized districts nor should the children in those districts be penalized because of the decisions of the electorate to continue such districts (p. 320).

McLure (1951), the American Association of School Administrators Commission on School District Reorganization (1958), Hooker and Mueller (1971), Johns and Morphet (1975), Honey (1978), and Sher (1978) also agreed with the use of geographical isolation factors, citing the responsibility of the state to recognize the necessary isolated school districts and to provide them with sufficient revenue to support an adequate educational program. The geographical isolation factor was regarded as a solution which did not entail the extremely high cost of additional state aid to all small schools, did not encourage continued operation of unnecessary small schools, did not force consolidation of small districts in disregard of local choice, and did not perpetuate or condone the inadequate programs in small isolated districts.

Although there are many solutions proposed for small school problems, none is unanimously favored. All are noted by some authorities as having negative aspects. The geographical isolation factor may be one viable solution to the problems faced by small schools.

Criteria

In order to implement a geographical isolation factor, the isolated schools must first be identified. Since the use of this factor is seen as a solution to problems of small schools, a maximum size must be established. Also, the criteria defining isolation must be determined (Minnesota, Department of Education 1977). This portion of the study will examine the literature related to these two types of criteria--isolation and size.

Isolation. The literature surveyed by this writer contained eleven suggested criteria to be used in defining isolated schools. The most frequently mentioned criterion was the distance factor. Ford, Hite, and Koch (1967); Johns and Morphet (1975); and Edington (1976) mentioned distance to the nearest neighboring school as a measure of isolation. Closely tied to distance is the travel time factor which considers the length of time students would be required to ride on a bus to get to school. Alves, Anderson, and Fowlkes (1939) suggested that elementary students not be required to spend more than one hour each morning or evening traveling to school and that the maximum time for high school students should be one and one-half hours. The National Commission on School District Reorganization (1948) suggested maximum one-way travel times of forty-five minutes and one hour for elementary and secondary students respectively. The Minnesota Department of Education (1977)

said that "the most critical issue . . . appears to be the time, or alternately the distance, which students would have to travel to get to school" (pp. 14-15). Kentucky law provides an example of this criterion in practice. Elementary schools in Kentucky are identified as isolated if the nearest neighboring school is greater than nine miles away or if more than 15 percent of the students would spend more than one hour traveling to or from the closest neighboring school (Kentucky 1978, sec. 157.320). Other states which use the distance or time criterion will be presented in the latter portion of this chapter.

A second criterion is related to the density of the population in a district. This is also referred to as population distribution. The American Association of School Administrators Commission on School District Reorganization (1958), Johns (1975), and the Minnesota Department of Education (1977) discussed this particular factor. The area of the district, used in the calculation of density, was included as a related measure of isolation by these sources. Pennsylvania applies this criterion in its geographical isolation factor. Population density of fifty persons per square mile is the maximum permitted to qualify for the sparsity aid factor while a density of one hundred persons per square mile is the maximum for the modified sparsity factor (Pennsylvania, Department of Education 1977).

A number of other isolation criteria have been proposed in the literature. The American Association of School Administrators (1939) suggested availability of natural resources, geographic location, topography, and climate as criteria for defining isolation. In 1958, the American Association of School Administrators Commission on School

District Reorganization added number and condition of highways to their suggested criteria. Ford, Hite, and Koch (1967) suggested using geographical location, climate, topography, and distance to classify geographically isolated schools. Edington (1976) also considered topography while the Minnesota Department of Education (1977) added the condition of alternative facilities as a subject worthy of consideration. None of these factors is used alone by any state in defining isolation.

It was suggested by some writers (e.g. Ford, Hite, and Koch 1967 and Johns and Morphet 1975) that these various criteria be considered by the state board of education or state department of education in determining isolation on an individual district basis. This approach was favored by Sher (1977).

> Some rural schools are quite self-sufficient and would be considered excellent by nearly any standard, while others are woefully inadequate and desperately in need of assistance. As a consequence, treating rural schools and school districts as if they were a unified, monolithic entity would be a serious mistake. The "primacy of local circumstance" is as applicable to the formulation of rural educational policy as it is to rural communities in general (p. 3).

The Minnesota Department of Education (1977), on the other hand, rejected the use of a district-by-district evaluation.

> The state board of education could examine all small districts and classify each of them as isolated or nonisolated. . . . [This] method would make possible the consideration of every factor which might affect the feasibility of consolidation; however, it would place an extremely heavy burden on the state board by requiring a careful and lengthy consideration of educational, geographic, demographic, and political issues in each of several hundred districts (p. 14).

Washington has used a system of "state determination" since 1965, employing as many as twelve different criteria in the definition of geographical isolation. Chapter VI presents material on Washington's use of state determination of isolation.

Thus, there are three basic methods of determining isolation: deciding on the basis of distance or travel time; deciding on the basis of density, area, or population distribution; and leaving the judgment to the state board of education or the state department of education which may make its determination on the basis of one or more criteria. The distance and density methods rely on objective data while the state determination method may be either objective or subjective. Chapters IV, V, and VI each present material on a state which employs one of these three methods.

Size. Since many of the problems which the geographical isolation factor seeks to minimize are associated with small size, the factor should set a maximum size limit for isolated districts. Inefficient operation was noted as a key problem of small schools, so this criterion should disqualify districts that are efficient enough to operate properly with normal revenues. Only those isolated districts which are small and inefficient should receive the geographical isolation factor's supplemental revenues.

> The typical sparsity adjustment . . . requires the state to specify "cut-offs" or "target" sizes for either districts or individual schools, or both. There is an assumption behind this type of legislation that there is some "optimum" district or school size to which all schools or districts should aspire. . . . the rationale is that schools or school districts operating below this "optimum" should be compensated for the fact that they will, at least in the foreseeable future, never be able to attain this desired "optimum" (Bothwell, Johnson, and Hickrod 1976, p. 57).

This section will survey some of the studies that have been done regarding school or district size to provide background for the establishment of a size criterion for the geographical isolation factor.

Some authors have recommended a "universal" size criterion which is not based on any particular geographical region and which should apply to most, if not all, schools. Smith (1960) found that "schools with an enrollment of less than 200-400 pupils are paying a premium for their educational programs" (p. 144). The National Commission on School District Reorganization (1948) recommended a minimum high school size of seventy-five students in each grade level while Conant (1959) considered one hundred students as a minimum size for a high school graduating class. Six hundred students was recommended as a "breaking point" for high schools by Mort (1933). Osburn (1970) derived an optimum size of 2,244. Johns and Alexander (1971) considered a somewhat larger enrollment when discussing the optimum size for a school district.

> Although many viewpoints have been expressed concerning the ideal size for a school district or an administrative unit, research has revealed that reasonable economies of scale cannot be secured until districts have at least 10,000 students. These same studies suggest that enrollments of 4,000 - 5,000 students might be defensible in sparsely populated areas. Even though these sizes may seem large in terms of the enrollments of some school districts, they should be construed as minimal rather than as optimal. Recommendations relating to optimal size often range from 20,000 to 50,000 pupils per administrative unit (p. 112).

Other studies have used cost and enrollment data from a particular area to suggest size categories for that area alone. White and Tweeten (1973), employing Oklahoma data, suggested that 675 students provide a school district with optimal operating efficiency. But they allowed for a range of enrollments which permits efficient operation.

> . . . the curve is very flat between 400 and 1,100 ADA [average daily attendance]. School districts can operate anywhere within this range without significant differences in per-unit costs. School districts operating outside this range face substantially higher per-unit costs (p. 51).

The Washington Temporary Special Levy Study Commission (1971) "found that districts with more than 1,000 students tend to provide a roughly comparable educational program" (p. 10). In an Iowa study, Cohn (1968) estimated optimum school size at about 1,500 pupils with a range of 1,277 - 1,663. Chambers, Odden, and Vincent (1976) found that "the financially optimal size for school districts in Missouri appears to be around 2500 students" (p. 31). Hanson (1964) recommended optimum school district sizes for a number of states, ranging from 20,000 students in Nebraska to 160,000 in New York.

In actual practice, the enrollment limits for schools which qualify for supplemental state aid are considerably lower than the recommended optimum sizes. Swift (1978) studied seventeen states which recognized small schools for additional funding and found that the maximum enrollments for such aid ranged from one hundred to one thousand students. The median size used by those states was 193 for elementary schools and 300 for secondary.

There are a number of problems associated with the establishment of a size criterion. White and Tweeten (1973) stated that "by ignoring transportation costs, past studies have provided misleading guidelines for optimal school district size, especially for rural areas" (p. 46). They noted that optimal size is determined by "tradeoffs between internal schooling economies and transportation diseconomies" (p. 45). Another author, Hickey (1969), agreed that size was not an absolute. He said that situational variables have a profound influence on size/quality relationships. The Washington Temporary Special Levy Study Commission (1971) found that size was of much less importance to elementary programs than it was to secondary programs. It appears that

those states which do provide supplemental aid to small schools have not relied on studies of optimal size.

> Based on communications with representatives of many of the states which recognize small schools or small districts, the rationale for a particular recognition [of size], with one notable exception [Florida], appears to be nebulous--or the rationale is lost in antiquity. The step function and refinements thereof which are used in several states are founded in the works of Mort (1924 and 1933) and McClure (1947). . . . More typical, however, are responses such as:
>
> It is historical. I cannot defend it.
>
> There are no data. There is no rationale. But the figures appear reasonable.
>
> We've always done it this way.
>
> and even
>
> They came from heaven. We cannot support them (Swift 1978, pp. 16-17).

In establishing a size criterion, then, a state could use sizes recommended by national authorities such as Conant (1959), could employ a research design such as that devised by Cohn (1968), or could choose to follow the advice of Hickey (1969) and consider the situational variables of individual areas or districts. Another method, proposed by Mohrenweiser (1979), would establish a curve which would gradually reduce aid as a district became larger, thus eliminating the significant impact of the size criterion upon districts near the cutoff point. Honey (1978) also suggested eliminating a single enrollment standard.

Funding

In addition to providing isolation and size criteria for identifying geographically isolated schools, the geographical isolation factor must have a funding dimension. The end result of using such a factor is the distribution of additional revenue to the identified schools. This portion of the study examines the literature regarding the funding of geographically isolated schools.

There are several methods for apportioning supplemental revenues to schools. Burrup (1977) said that "weighting factors are perhaps our best measures of the amount of additional resources and services needed to provide all students . . . with reasonably equal educational programs" (p. 275). Jordan (1975) and Johns and Morphet (1975) agreed, recommending that pupil weighting be used to distribute additional foundation program aid. Jordan supported the weighted pupil approach and noted that it provided greater flexibility to local school districts, established a uniform and comprehensive system of funding, and promoted more rational and objective bases of need. Johns and Alexander (1971) not only recommended the use of weighted pupil units but proposed a weighting system that provided .1 to .3 of a pupil unit in additional weighting for each student in an isolated school as compared with a student in a similar but non-isolated school. The weighting factors for geographical isolation could be calculated through the use of three different data sources: the actual costs of programs as determined through cost accounting procedures, the collective judgment of the state legislators in simply setting weighting factors, or anticipated program costs for a desired or exemplary program as determined through appropriate studies (Leppert et al. 1976). Garms, Guthrie, and Pierce (1978) suggested use of pupil weighting factors or a separate formula which could be used specifically for "necessary small schools." Johns and Morphet (1975) also suggested an alternative method for allocation of supplemental revenues. They said that the foundation program funds could be distributed on the basis of instructional units. The number of pupils required per allotted instructional unit could be decreased for small schools. As will be noted in the latter portion of this

chapter, states have used weighted pupil units, instructional or classroom units, and other allocation systems in the distribution of revenues for geographical isolation factors.

Whatever allocation system is used, Benson (1975) argued that it should be based on scientific information. This information should indicate what the additional costs are to these geographically isolated schools. Johns and Alexander (1971); Benson (1975); Selden (1975); and Garms, Guthrie, and Pierce (1978) recommended that the revenue plan be based on the need, or higher costs, associated with small school districts. Local ability to support education, the property valuation of the district, and other factors could also be considered when distributing this supplementary revenue (Johns and Alexander 1971; Washington, Temporary Special Levy Study Commission 1971).

Ford, Hite, and Koch (1967) and Hooker and Mueller (1970b, 1971) pointed out that the amount of revenue provided should enable the geographically isolated schools to support an adequate educational program comparable to that offered in the larger schools. On the other hand, residents of those districts which are small but are not geographically isolated should be prepared to provide a larger portion of the needed revenues from local sources (Morphet, Kingsley, and Howsam 1951).

Two statements provide the conclusion of this review of the literature regarding geographical isolation factors.

> The total cost of sparsity [and geographical isolation] corrections is insignificant when compared with the total monies appropriated for education . . . To those districts requiring such aid, however, it often means the difference between an adequate educational program and a highly inadequate one (Swanson 1966, p. 33).

Providing adequate funds for education will give a district or a school the opportunity to produce, but it will not guarantee, a good educational program; providing inadequate funds, however, will guarantee a poor program (Burrup 1977, p. 391).

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